

What is Claimed Is:

1. A method of adding primitives in real time to a model to produce a non-photorealistic rendering (NPR) of the model, comprising:
  - storing attribute data for each one of the primitives;
  - 5 providing a ring buffer, having at least one stage, for each vertex of the model which is to have a primitive, wherein
    - within each ring buffer, data is stored representative of a direction of each one of the primitives; and
    - retrieving information from the ring buffer by using a pointer, wherein the pointer is
    - 10 incremented and iterated over each stage of the ring buffer.
2. The method of claim 1, wherein the data stored in the ring buffer for each vertex includes information concerning the change in position of each vertex from frame to frame.
3. The method of claim 1, wherein a program selects vertices from the model to which to attach the primitives.
- 15 4. The method of claim 1, wherein the attribute information includes at least one of: a width, a color, a starting vertex position, and a visibility flag for each primitive.
5. The method of claim 1, wherein each ring buffer for each vertex has a set length.
6. The method of claim 1, wherein the attribute information is stored within the ring buffer for each vertex.
- 20 7. The method of claim 1, wherein the model is a 3-dimensional model.
8. The method of claim 1, wherein the primitives are at least one of polygons and motion line segments.
9. A real-time primitive drawing system, comprising:

a storage device for storing attribute data for at least one primitive to be added to a model;

a ring buffer, having at least one stage, for each vertex of the model to which to attach a primitive, wherein

5           within each ring buffer, data is stored representative of a direction of each one of the primitives; and wherein

          a pointer is used to retrieve information from the ring buffer, wherein the pointer is incremented and iterated over each stage of the ring buffer.

10. The system of claim 9, wherein the data stored in the ring buffer for each vertex includes

10           information concerning the change in position of each vertex from frame to frame.

11. The system of claim 9, wherein a program selects vertices from the model to which to attach each primitive.

12. The system of claim 9, wherein the attribute information includes at least one of: a width, a color, a starting vertex position, and a visibility flag for each primitive.

15           13. The system of claim 9, wherein each ring buffer for each vertex has a set length.

14. The system of claim 9, wherein the attribute information is stored within the ring buffer for each vertex.

15. The system of claim 9, wherein the model is a 3-dimensional model.

20           16. The system of claim 9, wherein the primitives are at least one of polygons and motion line segments.

17. A real-time primitive drawing program, comprising:

          a computer-readable medium; and

a computer-readable program code, stored on the computer-readable medium,  
having instructions to

store attribute data for at least one motion line to be added to a model;

read from and write to a ring buffer, having at least one stage, for each

5 vertex of the model to which to attach a primitive,

wherein within each ring buffer, data is stored representative of a

direction of each one of the primitives;

use a pointer to retrieve information from the ring buffer, wherein the pointer is

incremented and iterated over all segments of the ring buffer.

10 18. The real-time primitive drawing program of claim 17, wherein the data stored in the ring  
buffer for each vertex includes information concerning the change in position of each vertex  
from frame to frame.

19. The real-time primitive drawing program of claim 17, wherein a program selects vertices  
from the model to which to attach the motion lines.

15 20. The real-time primitive drawing program of claim 17, wherein each ring buffer for each  
vertex has a set length.

21. The real-time primitive drawing program of claim 17, wherein the attribute information is  
stored within the ring buffer for each vertex.

20 22. The real-time primitive drawing program of claim 17, wherein the model is a 3-dimensional  
model.

23. The real-time primitive drawing program of claim 17, wherein the primitives are at least one  
of polygons and motion line segments.

24. An apparatus for adding primitives in real time to a model, comprising:

a storage device for storing attribute data for at least one primitive to be added to a model;

a ring buffer, having at least one stage, for each vertex of the model to which to attach a primitive, wherein

5                   within each ring buffer, data is stored including a direction of each one of the primitives; and

a pointer for retrieving information from the ring buffer, wherein the pointer is incremented and iterated over each stage of the ring buffer,

an apparatus on which the resultant primitives are rendered and displayed.

10   25. The apparatus of claim 24, wherein the data stored in the ring buffer for each vertex includes information concerning the change in position of each vertex from frame to frame.

26. The apparatus of claim 24, wherein a program selects vertices from the model to which to attach the primitives.

27. The apparatus of claim 24, wherein each ring buffer for each vertex has a set length.

15   28. The apparatus of claim 24, wherein the attribute information is stored within the ring buffer for each vertex.

29. The apparatus of claim 24, wherein the model is a 3-dimensional model.

30. The apparatus of claim 24, wherein the primitives are at least one of polygons and motion line segments.

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